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a catenating module configured to catenate in the second memory system the second memory operand portion with the first memory operand portion, thereby forming catenated data; and

a reading module configured to read at least a portion of the catenated data which is greater in width than the first data path width.

REMARKS

Present Invention

The present invention is directed to a system and method for improving the performance of general purpose processors by expanding at least one source operand to a width greater than the width of either a general purpose register or a data path width. A system and method is disclosed and includes copying a first memory operand portion from the first memory system to the second memory system, the first memory operand portion having the first data path width, copying a second memory operand portion from the first memory system to the second memory system, the second memory operand portion having the first data path width and being catenated in the second memory system with the first memory operand portion, thereby forming catenated data, and reading at least a portion of the catenated data which is greater in width than the first data path width.

35 U.S.C. § 112 Claim Rejections

By the Office Action dated August 16, 2000, the Examiner has rejected claims 1-4 under 35 U.S.C. § 112.

Claim 1

The Examiner rejected claim 1 under 35 U.S.C. § 112. Specifically, the Examiner asserted, that "[c]laim 1 recites the limitation 'the catenated data' in line 10 . . . [and that] [t]here is insufficient antecedent basis for this limitation." (See Office Action, page 2, paragraph 4.)

The Applicants have amended claim 1, and, respectfully submit that claim 1, as amended, complies with the requirements of 35 U.S.C. § 112.

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Claim 2

The Examiner rejected claim 2 under 35 U.S.C. § 112. Specifically, the Examiner asserted that claim 2 is "rejected for incorporating the deficiencies of [its] . . . base claim." (See Office Action, page 2, paragraph 5.)

The Applicants have amended claim 2, and, since claim 2 depends on claim 1 and claim 1 has been amended, the Applicants respectfully submit that claim 2, as amended, complies with 35 U.S.C. § 112.

Claim 3

The Examiner rejected claim 3 under 35 U.S.C. § 112. Specifically, the Examiner asserted that claim 3 is "rejected for incorporating the deficiencies of [its] . . . base claim." (See Office Action, page 2, paragraph 5.) In addition, the Examiner asserted that "claim 3, line 2, recites the limitation 'shape'[, that] since 'shape' is not definite, [it] . . . is not clearly understood what shape applicant is referred (*sic*) to[, and that] [t]herefore, it makes the claim language vague." (See Office Action, page 2, paragraph 6.)

The Applicants have amended claim 3, and, since (a) claim 3 depends on claim 1, (b) claim 1 has been amended, and (c) claim 3 has been amended, the Applicants respectfully submit that claim 3, as amended, complies with 35 U.S.C. § 112.

Claim 4

The Examiner rejected claim 4 under 35 U.S.C. § 112. The Examiner asserted that claim 4 is "rejected for incorporating the deficiencies of [its] . . . base claim." (See Office Action, page 2, paragraph 5.) In addition, the Examiner asserted that "claim 4, line 2, recites the limitations 'the operand portion' and 'the operand' [and that] there is insufficient antecedent basis for these limitations in the claim." (See Office Action, page 2, paragraph 7.)

The Applicants have amended claim 4, and since (a) claim 4 depends on claim 1, (b) claim 1 has been amended, and (c) claim 4 has been amended, the Applicants respectfully submit that claim 4, as amended, complies with 35 U.S.C. § 112.

35 U.S.C. § 103 Claim Rejections

By the Office Action dated August 16, 2000, the Examiner has rejected claims 1-4 under 35 U.S.C. § 103(a) as being unpatentable over Gahan et al (U.S. Patent No. 5,600,814) (hereinafter "Gahan") in view of Kwon (U.S. Patent No. 5,768,546). Gahan teaches a system for a subsystem using shortwords to communicate with a main

memory using longwords. Kwon teaches a system capable of bi-directional data transmission between two buses having different data word widths and a system using multi-clock signals to transmit data words of different widths.

In order to form a proper obviousness rejection of a claim under 35 U.S.C. § 103(a), these references together must teach or suggest each element of the claim, including the relationships between the elements. If any element is not fully taught by the combined references, the rejection cannot be sustained.

Evaluating Gahan and Kwon in this light, it is appropriate to examine the portions of Gahan and Kwon which the Examiner has pointed to as teaching the claimed elements.

Claim 1

The Examiner asserted that "Gahan et al. disclosed substantially the invention claimed, including a system having a functional unit data path width, a first memory system having a first data path width (Fig. 1, item No. 11, col. 3, line 5), a second memory system having a first data path width which is greater than the functional unit data path width, and greater than the first data path width (Fig. 1, Item No. 12, col. 3, lines 6-9)." (See Office Action, page 3, paragraph 3.) The Examiner admitted that "Gahan et al. did not disclose the steps of: copying a first memory operand portion from the first memory system data; copying a second memory operand portion from the first memory system to the second memory system, the second memory operand portion having the first data path width and being catenated with the first memory operand portion; and reading at least a portion of the catenated data which is greater than the first data path width." (See Office Action, page 3, paragraph 4.)

The Examiner then asserted that "Kwon disclosed copying a first memory operand portion from the first memory system data (col. 2, lines 52-55; col. 3, lines 19-22); copying a second memory operand portion from the first memory system to the second memory system, the second memory operand portion having the first data path width and being catenated with the first memory operand portion; and reading at least a portion of the catenated data (col. 2, lines 59-63; col. 3, lines 22-25)." (See Office Action, page 3, paragraph 4.) The Examiner further asserted that "[i]t would have been obvious to one ordinary skill in the art at the time the invention was made to combine the teachings of Kwon with the teachings of Gahan et al. because Kwon's teachings

would provide an improved memory system having different data path widths.")." (See Office Action, page 4.)

Per the Examiner's language at pages 3 and 4 of the Office Action, it appears that the Examiner has asserted the following correspondence between Gahan and Kwon and claim 1, as amended:

Claim 1	**Gahan**	**Kwon**
In a system having		
a data path functional unit having a functional unit data path width,	Figure 1, item number 11 and col. 3, line 5.	Kwon does not teach or suggest this claim feature.
a first memory system having a first data path width, and	Figure 1, item number 11 and col. 3, line 5.	Kwon does not teach or suggest this claim feature.
a *second memory system* having a data path width which is greater than the functional unit data path width and greater than the first data path width, a *method* comprising:	Gahan does not teach or suggest this claim feature.	Kwon does not teach or suggest this claim feature.
copying a first memory operand portion from the first memory system to the second memory system, the first memory operand portion having the first data path width;	Gahan does not teach or suggest this claim feature.	Col. 2, lines 52-55 and col. 3, lines 19-22.

copying a *second* memory operand portion from the first memory system to the second memory system, the *second* memory operand portion having the first data path width and *being catenated in the second memory system* with the *first* memory operand portion, *thereby forming catenated data*; and	Gahan does not teach or suggest this claim feature.	Kwon does not teach or suggest this claim feature.
reading at least a portion of the *catenated* data which is greater *in width* than the first data path width.	Gahan does not teach or suggest this claim feature.	Kwon does not teach or suggest this claim feature.

In reviewing the cited portions of Gahan and Kwon, however, it becomes apparent that Gahan and Kwon have been generalized, and, in fact, do not support the position asserted by the Examiner.

A system having . . . a *second memory system* having a data path width which is greater than the functional unit data path width and greater than the first data path width

In particular, neither Gahan nor Kwon, alone or in combination, teach or suggest the claim feature of "a system having . . . a *second memory system* having a data path width which is greater than the functional unit data path width and greater than the first data path width," as required by claim 1. In particular, Gahan teaches "[r]eferring to FIG. 1, [a] . . . system [which] comprises a [*single*] *main memory* coupled to a data bus 11 and a address bus 12." (See Gahan, col. 3, lines 4-5.)

Therefore, Gahan does not teach a system which includes a *second memory system*, and, therefore, Gahan cannot teach a "*second memory system* having a data path width which is greater than the functional unit data path width and greater than the first data path width," as required by claim 1. Kwon does not teach "a system having a data path functional unit having a functional unit data path width, a first memory system having a first data path width, and a *second memory system* having a data path width which is greater than the functional unit data path width and greater than the first data path width," as required by claim 1. Therefore, neither Gahan nor Kwon, alone or in combination, can teach or suggest the required claim 1 element of "a system having . . . a *second memory system* having a data path width which is greater than the functional unit data path width and greater than the first data path width."

Copying a *second* memory operand portion from the first memory system to the second memory system, the *second* memory operand portion having the first data path width and *being catenated in the second memory system* with the first memory operand portion, *thereby forming catenated data*

In addition, neither Gahan nor Kwon, alone or in combination, teach or suggest the claim feature of "copying a *second* memory operand portion from the first memory system to the second memory system, the *second* memory operand portion having the first data path width and *being catenated in the second memory system* with the first memory operand portion, *thereby forming catenated data*," as required by claim 1. In particular, the Examiner admitted that Gahan does not teach this claim element. (See Office Action, page 3, paragraph 4.) In addition, Kwon teaches "a first latch for latching the *data word* from the first memory in a first predetermined number of byte; a first selector for selecting the bytes latched in the first latch in a second predetermined number of bytes." (See Kwon, col. 2, lines 56-59.) In other words, Kwon teaches (1) manipulating a *single* data word first with a latch and then (2) manipulating the *single* data word with a selector. Therefore, Kwon does not teach manipulating *two* memory operand portions or *two* data words, as required by claim 1. Therefore, Kwon cannot teach "copying a *second* memory operand portion from the first memory system to the second memory system," as required by claim 1.

In addition, Kwon teaches "*converting* a width of data word from the first system bus into a width of a data word of the second system bus, and outputting the converted data word to the second system bus." (See Kwon, col. 3, lines 19-22.) The

converting which Kwon teaches is not the same as the *catenating* required by claim 1. In other words, Kwon does not teach *catenating* a *second* memory operand portion with a *first* memory operand portion and does not teach *forming catenated data*, as required by claim 1. In addition, as discussed above, Kwon teaches manipulating a *single* data word with a *single memory system*. Therefore, Kwon cannot teach *catenating* a *second* memory operand portion in a *second memory system* with a *first* memory operand portion and cannot teach *forming catenated data*, as required by claim 1. Therefore, Kwon cannot teach "the *second* memory operand portion having the first data path and *being catenated in the second memory system* with the *first* memory operand portion, *thereby forming catenated data*," as required by claim 1.

Therefore, neither Gahan nor Kwon, alone or in combination, can teach or suggest the required claim element of "copying a *second* memory operand portion from the first memory system to the second memory system, the *second* memory operand portion having the first data path width and *being catenated in the second memory system* with the *first* memory operand portion, thereby *forming catenated data*," as required by claim 1.

***Reading* at least a portion of the *catenated* data which is greater *in width* than the first data path width**

In addition, neither Gahan nor Kwon, alone or in combination, teach or suggest the claim feature of "*reading* at least a portion of the *catenated* data which is greater *in width* than the first data path width," as required by claim 1. In particular, the Examiner admitted that Gahan does not teach this claim element. (See Office Action, page 3, paragraph 4.) In addition, Kwon cannot teach "*reading* at least a portion of the *catenated* data" since Kwon neither forms nor manipulates *catenated* data, as required by claim 1. (See Kwon, col. 3, lines 19-22.) Therefore, neither Gahan nor Kwon, alone or in combination, can teach or suggest the required claim element of "*reading* at least a portion of the *catenated* data which is greater *in width* than the first data path width," as required by claim 1.

It is therefore clear that neither Gahan nor Kwon, alone or in combination, can teach or suggest each element of claim 1, and, therefore, a rejection of claim 1 under 35 U.S.C. § 103(a) is inappropriate.

Claims 2-4

Since claims 2-4 depend on claim 1, neither Gahan nor Kwon, alone or in combination, can teach or suggest each element of claims 2-4, and, therefore, rejections of claims 2-4 under 35 U.S.C. § 103(a) are also inappropriate.

Claims 5-12

The Applicants respectfully submit that new claims 5-12 have adequate support in the disclosure and are in condition for allowance.

Conclusion

It is therefore clear that claims 1-12 of the present application define over the cited art and comply with the requirements of 35 U.S.C. §§ 112 and 103. In addition, the specification has been amended. The application is therefore in condition for allowance. Early notification to that effect is respectfully solicited. In the event that any issue remains unresolved, the Examiner is invited to telephone the undersigned at 650-233-5559.

Respectfully Submitted,

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